AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for encoding a residual image using basis functions from an overcomplete library, said method comprising:

obtaining the residual image, said residual image having a size and an energy; and

decomposing said residual image into a list of one or more atoms, each atom representing a basis function from the overcomplete library, decomposing said residual image comprising:

identifying a replacement region in the residual image for representation by an atom, the replacement region being determined by adding an adjacent block to an initial block of the residual image when an energy of the adjacent block exceeds an energy threshold~~using a residual energy segmentation~~;

creating a subset of basis functions from the overcomplete library, each basis function in the subset matching with a shape of the replacement region within a predetermined threshold;

identifying an atom within the subset of basis functions using progressive elimination, said atom for representing the replacement region and said atom having parameters;

quantizing said atom and modifying the parameters of the atom into a form suited for encoding;

encoding said quantized atom, subtracting said atom from the replacement region in the residual image to reduce the energy of the residual image and using a quadtree-based atom coder to reduce the size of the residual image; and

when a reduced size of the residual image or a reduced energy of the residual image does not achieve a predetermined criteria; further identifying a replacement region, creating, identifying an atom within the subset of basis functions, quantizing, and encoding.

2. (Cancelled)

3. (Cancelled)

4. (Currently Amended): The method according to claim 1~~3~~, wherein identifying a replacement region comprises:

sequentially adding further adjacent blocks to the adjacent block of the residual image in a first direction until an energy of one of the further adjacent blocks is below the energy threshold; and

sequentially adding adjacent blocks to the initial block of the residual image in a second direction until an energy of one of the adjacent blocks is below the energy threshold~~identification of an initial region within the residual image having a highest energy, and growing the RESA rectangle therefrom~~.

5. (Previously Presented): The method according to claim 1, wherein identifying an atom within the subset of basis functions comprises determining an inner product between a basis function and the replacement region, wherein a maximum absolute value of the inner product indicates a best match.

6. (Cancelled):

7. (Currently Amended): The method according to claim 1~~2~~, wherein identifying an atom within the subset of basis functions comprises ~~the progressive elimination algorithm~~ removing~~removes~~ basis functions from the subset of basis functions by comparing a basis function currently being evaluated with a previously evaluated basis function.

8. (Previously Presented): The method according to claim 1, wherein quantizing the atom comprises determining a quantizer based on a comparison between the atom and the replacement region.

9. (Original): The method according to claim 1, wherein the predetermined criteria is determined based on a desired bit stream size.

10. (Currently Amended) An apparatus for encoding a residual image using basis functions from an overcomplete library, said apparatus comprising:

    means for obtaining the residual image, said residual image having a size and an energy; and

    means for decomposing said residual image into a list of one or more atoms, each atom representing a basis function from the overcomplete library, said means for decomposing said residual image including:

    means for identifying a replacement region in the residual image for representation by an atom, the replacement region being determined by adding an adjacent block to an initial block of the residual image when an energy of the adjacent block exceeds an energy threshold~~using a residual energy segmentation algorithm~~;

    means for creating a subset of basis functions from the overcomplete library, each basis function in the subset matching with a shape of the replacement region within a predetermined threshold;

    means for identifying an atom within the subset of basis functions using progressive elimination, said atom for representing the replacement region and said atom having parameters;

    means for quantizing said atom and modifying the parameters of the atom into a form suited for encoding;

    means for encoding said quantized atom, subtracting said atom from the replacement region in the residual image thereby reducing the energy of the residual image and using a quadtree-based atom coder to reduce the size of the residual image; and

    means for determining when a reduced size of the residual image or a reduced energy of the residual image does not achieve a predetermined criteria.

11. (Currently Amended) A computer program product comprising a computer readable medium having a computer program recorded thereon for performing a method for encoding a residual image using basis functions from an overcomplete library comprising:

    obtaining the residual image, said residual image having a size and an energy; and

decomposing said residual image into a list of one or more atoms, each atom representing a basis function from the overcomplete library, decomposing said residual image including the steps of:

identifying a replacement region in the residual image for representation by an atom, the replacement region being determined by adding an adjacent block to an initial block of the residual image when an energy of the adjacent block exceeds an energy threshold~~using residual energy segmentation algorithm~~;

creating a subset of basis functions from the overcomplete library, each basis function in the subset matching with a shape of the replacement region within a predetermined threshold;

identifying an atom within the subset of basis functions using progressive elimination, said atom for representing the replacement region and said atom having parameters;

quantizing said atom and modifying the parameters of the atom into a form suited for encoding;

encoding said quantized atom, subtracting said atom from the replacement region in the residual image thereby reducing the energy of the residual image and using a quadtree-based atom coder to reduce the size of the residual image; and

when a reduced size of the residual image or a reduced energy of the residual image does not achieve a predetermined criteria, further identifying a replacement region, creating, identifying an atom within the subset of basis functions, quantizing, and encoding.

12.   (New) The method according to claim 7, wherein the basis function currently being evaluated is removed when the basis function currently being evaluated is determined not to be a best match using a triangle inequality.